REMARKS

Claims 1-20 are pending in this application. Claims 9-12 have been withdrawn as being directed to a non-elected invention. By this Amendment, claims 1 and 13 are amended. No new matter is added.

Restriction Requirement

The Office Action requires an affirmation of the election of Group I, claims 1-8 and 13-20. Applicant hereby affirms the election of Group I. Applicant reserves the right to file a divisional application for the non-elected subject matter.

Section 112, Second Paragraph, Rejection

The Office Action rejects claims 1-9 under 35 U.S.C. 112, second paragraph, for containing asserted informalities. Applicant believes that this rejection is overcome with the above amendments to claim 1. Reconsideration and withdrawal of the rejection of claims 1-9 and 13-20 under 35 U.S.C. 112, second paragraph, are respectfully requested.

Section 101 Rejection

The Office Action rejects claims 1-9 and 13-20 under 35 U.S.C. 112, second paragraph, for containing asserted informalities. Applicant believes that this rejection is overcome with the above amendments to claims 1 and 13. Reconsideration and withdrawal of the rejection of claims 1-9 and 13-20 under 35 U.S.C. 101 are respectfully requested.

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Section 103 Rejection

The Office Action rejects claims 1-9 and 13-20 under 35 U.S.C. 103(a) as being obvious over Katz et al. (U.S. Patent No. 5,224,034) in view of Vandivier, III (U.S. Patent No. 5,033,004). This rejection is traversed.

The presently claimed invention is directed to a method by which a non-commodity material or item can be bought and sold over a computer network. As noted on page 1 of the present specification, non-commodity materials or items are "materials or items that cannot be solely distinguished by price alone, in that subtle differences in features or chemical/physical characteristics will influence the performance of a particular process or design that utilizes the material or item" (see page 1, lines 7-11 of the present specification). Examples of non-commodity materials or items include coal, paper pulp, crude oil, etc.

The Office Action asserts that Katz et al. discloses an "automated method for conducting buy and sell transactions over a network for a non-commodity material or item that can have differing characteristics..."

However, Applicant can locate no teaching or suggestion in Katz et al. regarding non-commodity materials or items. Katz et al. do disclose an automated system for minimizing the procurement costs for items that can be solely **distinguished by price alone**. In the overview of their process, Katz et al. provide an example where there "are three products of interest designated P1, P2, and P3, respectively...The products are offered by three different vendors, designated V1, V2, and V3. Each vendor sells each product on a commitment and as-ordered basis" (see Katz et al. column 3, lines 47-62).

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The Katz et al. products do not vary in chemical/physical characteristics that influence the performance of a particular process or design that utilizes the material or item and **the products ar   compared by price alone by Katz et al.**

Thus, for at least the above reasons, Katz et al. is non-analogous to the presently claimed invention.

Additionally, the present claims require, *inter alia*, the steps of "a buyer providing to the computer network **a performance simulation model** of [a chemical, mechanical, or electrical process with equipment (claims 1-8) or a power production process in power generation equipment (claims 13-20)] currently in operation or intended to be in operation and with a desired amount of [a non-commodity (claims 1-8) or coal (claims 13-20)] for use in the process, the performance simulation model being able to estimate the [production cost and operating characteristics of the process (claims 1-8) or the performance of the power generation process (claims 13-20)] based on chemical and physical [and /or electrical characteristics of the non-commodity material or item used in the process (claims 1-8) or physical characteristics of coals (claims 13-20)" (emphasis added).

Applicants respectfully submit that neither Katz et al. nor Vandivier teach or suggest a buyer providing to a computer network a performance simulation model, as required by the present claims. Thus as this required element of the present claims is missing from the asserted combination of Katz et al. and Vandivier, it is further respectfully submitted that the presently claimed invention would not have been obvious over the asserted combination of references.

It is further submitted that the steps in the present process which utilize the performance simulation model of a process provided by the buyer ("providing a desired maximum cost of operating the process"; "estimating the cost of operating the process..."; "providing the buyer with a list...") are of course not taught or suggested in either of the applied references.

Thus as these additional required elements of the present claims are missing from the asserted combination of Katz et al. and Vandivier, it is further respectfully submitted that the presently claimed invention would not have been obvious over the asserted combination of references.

In any case, Applicant takes this opportunity to note in more detail distinctions between the present invention and the applied references.

First, Applicant notes that Vandivier, III is directed to a method and system for blending coal and other natural resources.

The present specification describes how an engineering process model is used to identify the characteristics of an input reagent, chemicals, or other "feedstock" that optimize the commercial operation of a production process. Further, the present invention provides for an automated method to select from a database of such inputs in a marketplace, the supplier or combination of suppliers that provide the desired reagent for the least delivered cost.

The specific example discussed is the case of electricity production from coal.

There are several distinguishing features of the present invention that distinguish it from the prior art. Most significantly, regarding Vandivier, the present invention (a) employs an engineering process model that simulates the thermal performance and

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assigns the technical risk of malperformance for any given coal, and (b) presents these results in a manner that shows the production cost versus technical risk associated with each coal. This depiction of results allows the plant operator to select the best coal for a given unit, based on production cost and the commensurate technical risk, based on the coal supplies presently available in the market. This method distills the coal selection process to a risk versus payoff decision that characterizes most financial decisions.

In contrast, Vandivier does not contemplate an engineering process model or any means by which the owner or operator of the plant can identify the optimal characteristics of the coal. As described by Vandivier, the plant owner has to decide for themselves what is best to optimize for the coal mine or the power plant. Vandivier offers an extremely limited choice of physical attributes – heating value, sulfur content, ash content, or another variable. The scope of Vandivier method is limited to optimizing the value of a single output, and does not allow the decision-maker the ability to use other information than this sole criterion.

Figure S-1 graphically depicts the results from the engineering process model (referred to as Quality Screen in the Application) which were introduced in the table on page 26 of the Application. Figure S-1 shows that each coal is assigned a production cost, comprised of both fuel and secondary cost and a technical risk factor (both described subsequently). In the present deregulated and competitive utility operating environment, selecting the optimal coal cannot be condensed in to specifying the minimal or maximum of any one simple characteristic or criteria. Rather, the plant operator benefits most by selecting from the coals available in the marketplace that which provides for a desired production cost commensurate with an acceptable level of risk and uncertainty in

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operation. Figure S-1 also shows the projected range of power price over a future period, and by comparing this forward electricity price to the estimated production cost and risk, the profit versus risk decision for any one unit can be estimated. Significantly, Figure S-1 reduces the coal selection decision to the same risk versus payoff decision that characterizes any financial decision.

This method markedly contrasts to the method described by Vandivier, where a linear programming technique describes how to maximize the outcome of one variable, which must be selected by the operator.

Figure S-1 is of greatest use when representing the coals that are presently available in the market, and thus must reflect timely pricing and availability information that can change daily, including transportation options. Accordingly, the ability to represent the coals available in the marketplace provides greater flexibility than the limited inputs described by Vandivier.

The method of Katz does not evaluate an array of options, but rather seeks to find the supplier with the least cost offering, based on volume discounts, that meets a predefined set of specifications. As will be shown in the subsequent discussion, the least cost coal does not necessarily lead to the least production cost, and is not necessarily the best choice depending on the technical risk incurred. The present invention employs the internet to access timely market availability of coals, and generate a wide array of points on Figure S-1, from which the optimal with respect to production cost and risk can be selected. The key elements to Katz's methodology are a volume discount pricing arrangement and a linear programming technique. Again, this methodology knows only one outcome – minimizing acquisition cost (not considering transport and delivery). This is

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in marked contrast the proposed inventive method – providing a large array of points from which the best production cost versus risk decision can be rendered.

In addition, the present invention can utilize an analysis of full trace elements and various metal oxides within the inorganic ash that are not contemplated by Vandivier (see Table A-1 of the Application). These characteristics could not have been contemplated by Vandivier, as they are required inputs for a furnace performance model, and affect furnace performance, which is not addressed by Vandivier.

It should be recognized that the role of blending is only one element of the present invention, and is not a necessary element of the decision-making. In fact, the majority of coal purchased is not a blend prepared at the plant, but from a single source or mine. Accordingly, the present invention can use an engineering performance model to identify the coal from sole sources as well as blends.

Two other elements of the system distinguish the method – a transport model to transform the coal cost at the mine to a delivered coal cost, and a neural network and data mining techniques to update the process performance model. Neither Vandivier or Katz describe a method to identify the transport costs – which for coal can exceed the production cost at the mine. Further, the neural network can impart into the risk assessment provided by the engineering process model real-word experience, to improve future analysis.

Operators of coal-fired power plants constantly search for ways to insure they generate the least cost electricity. Coal is an excellent example of a non-commodity – approximately 10 physical characteristics and 40 chemical constituents define almost any coal as unique. Significantly, the least cost coal does not necessarily – and in fact rarely –

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provides the least power production cost. This is due to the contribution of secondary operating factors to the cost. Several specific examples illustrate this point. Depending on the ash chemistry, high values of sodium content (Na_2O) will increase slagging and fouling of the furnace. The accumulation of deposits from slagging and fouling by this inorganic material can compromise plant thermal efficiency, and can limit operation at peak load. Similarly, high fixed carbon and silica in ash (SiO_2) will reduce grindability and thus may prevent carbon from being completely utilized within the furnace, again compromising thermal efficiency. As a further example, trace chemical constituents within ash such as chlorides and fluorides can interfere with the chemistry of environmental control systems, specifically the effectiveness with which the desulfurization process removes SO_2. Similarly high arsenic content can prematurely poison catalyst installed for selective catalytic reduction of NOx control. These are but a few examples of the "secondary" impacts of coal on the power production process,

These secondary impacts are misnamed – cumulatively, they can comprise a significant component of operating cost. Also, especially for furnace slagging and fouling, and corrosion of surfaces, certain coals can compromise reliability, limit thermal efficiency, restrict plant output, or require that an outage scheduled for maintenance be accelerated. These deleterious effects can be quantified, and be assembled into an aggregate indicator of furnace performance. In summary, the least cost coal delivered to the mine may not offer the least production cost, and further may incur significant operating risk.

Vandivier addresses simply the physical attributes of coal – specifically the best way to prepare a given composition, defined by 5 attributes. The methodology described is a particular form of linear programming optimization, which is not the same as the

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process simulation model employed in the present invention. The methodology of Vandivier is useful only to know how to best prepare a given recipe of coal, once someone else has already determined what the optimal recipe should be. No process simulation model is used in Vandivier.

To emphasize how the present invention method differs from Vandivier, one aspect of the present invention – an example of a plant simulation model – is described.

Historically, selecting coal composition for a particular station has required considerable guesswork, based on empirical experience with similar coals. Each power station is initially designed for a specific coal or range of coals, but frequently these coals are no longer available, economical to mine; or experience may show they induce performance problems the operator desires to avoid. Over the last 20 years, computer-based performance simulation models have been developed. These simulation models can predict the value of secondary impacts on operating cost, and be used to assess the risk in terms of meeting production goals.

Figure S-1 provides a more elaborate depiction of data originally presented in the Table on page 26 of the Application, in which the assessed risk or uncertainty in performance with a set of coals is compared to the estimated production cost. The specific example shown is the Slagging Risk Factor, but could equally be a risk factor regarding some other feature of power plant performance, or a cumulative factor as determined by the process performance model. The process performance model employs a mathematical simulation of the physics, chemistry, and engineering subroutines of a power station. Most of the process performance models compute reacting flow fields, estimate product of combustion at different residence time within the furnace, project heat

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transfer rates within different zones of the boiler, and estimate product steam quality. All of the secondary impacts defined previously – and dozens more – are quantitatively estimated. A total score is assigned based on the performance data. For example, on an arbitrary scale of 100, the "risk" incurred by a certain coal could be relatively high (90), if the furnace and heat transfer models predicted slagging/fouling potential was significant, the combustion model estimated that carbon would not be completely utilized, and the chlorides and fluorides in the ash affected the chemistry of environmental controls such that SO_2 removal was inhibited. Alternatively, other coals could incur scores that are moderate (40-60) or low (10-20). These scores are the basis of the low, medium, and high rating listed in the referenced Table.

Figure S-1 depicts the results of this analysis using coals available to the user, such as from a coal market database developed and maintained on the internet, as described in the present specification. As shown, the coals that provide for least production cost incur the highest risk.

This chart can be used to compare the production cost and risk to projections of long-term power prices, and guide the coal selection decision. Projecting the results of the process production model in this manner distills the coal purchase decision to the same risk versus payoff analysis common to many other financial or investment decision.

Generating Figure S-1 requires a process model, a database of coals, and mechanism to project the cost of coal delivered to the site. Further, ideally any lessons learned from actual operating experience with any of the coals used should be factored into future analysis; the neural network method is proposed to provide that role. In the

Application for the present method, these are described in more detail, and are referred to as the Quality Screening Model, BlendSearch Tool, and Transport Model.

Vandivier does not addresses the scope or result of the present invention method. Table 1 compares the proposed method and that of Vandivier.

TABLE 1:
COMPARISON OF FEATURES OF
PRIOR ART OF VANDIVIER AND PROPOSED METHOD

Item	Proposed Method	Vandivier
Blending methodology for coal to maximize use of resources and time	Not addressed	Addressed, featuring attributes key to production of a mine, and coal cleaning plant operation
Characteristics of coal addressed	Detailed ultimate analysis and ash chemistry, per Table on page 26	Four attributes: sulfur, moisture, heat value, ash, and cost ($/ton)
Plant performance model, predicting electricity cost, $/MWH (Quality Screening Model)	Presents net production cost, based on fuel cost and secondary impacts, for each coal	Power plant operating costs, other than coal supply, not addressed
	Estimates performance and assess operating risks. Combined with cost, presents net production cost versus risk, for each coal	Power plant operating characteristics (slagging, fouling, emissions) are not addressed
Transport model	Identifies least-cost routing of coal from the mine source, to the station	Not addressed; the User must identify their own transport costs.
BlendSearch - Finds blends of coals that provide the desired production cost	Searches a market database of coal to identify blends that provide additional	Vandivier, rather than finding the coal best suited for the operator, finds the best recipe for assembling a blend that the

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versus risk characteristic.	options for the production cost versus risk analysis(uses ultimate analysis and ash chemistry)	operator has already identified by other means as optimal.
Neural Network to impart real-world experience to the risk assessment feature of the process model.	Insures that real operating experience is factored into the process model ,and coal selection decision-making	Not addressed.

The items in Table 1 are described as follows:

Blending Methodology

The best use of a coal mine, coal cleaning process, or inventory is treated by Vandivier. Vandivier teaches that certain of these four attributes are constrained, and one is "optimized". Thus, an operator must select one variable by which to make the coal purchase decision.

Coal Characteristics

The attributes of coal go far beyond the four simple physical characteristics contemplated by Vandivier. Most significantly, a broad suite of chemical constituents are included to distinguish the performance of the furnace in terms of slagging and fouling, and for the operation of environmental control equipment. These are the ultimate analysis and ash chemistry identified in the table on page 26. For example, these include the alkaline and alkaline earth compounds that are oxides of Na, Ca, K, and Mg. These compounds are important in determining the alkaline reagent that must be added to a lime or limestone based wet or dry SO_2 scrubber, the resisitivity of the fly ash captured on a plate in an ESP,

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or the net SO_3 emitted due to inherent boiler oxidation or that promoted by an SCR catalyst. Also, the components of fly ash that affect erosion – such as oxides of silica, aluminum, and titanium and influence the design of boiler tubes and catalyst for SCR NOx control – are important.

The use of these additional characteristics would not have been obvious from Vandivier, as they cannot be controlled independent of the proximate analysis (S, moisture, ash, and heating value) that is the subject of Vandivier method.

Plant Performance Model (Quality Screen)

This process performance model identifies the cost (both direct and secondary) and production characteristics of the power plant, for candidate coals considered. As a consequence, the optimal characteristics of the coal - with respect to the power production process, and not the coal production process – are determined. Once the power plant owner is informed of the composition of the best coals, these can be accessed directly from the market. Alternatively, the sources that can be accessed to provide this composition from blends of coals (Blend Search).

Transport Model

The cost of the non-commodity item - in this case coal – considered by the proposed method is the delivered cost to the power generation source. The additional cost for transport and handling is not trivial for coal, and in fact for western subbituminous coals that are utilized in the Midwest or East can exceed the production cost at the mine. The proposed method employs a transport model that uses knowledge of the available rail

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and barge links possible from the mine to the ultimate delivery site, the number of times the coal must be handling (e.g. transferred from one delivery media to another) and the relevant labor rates. It is conceivable and likely that in some cases the least cost coal delivered to a site is not the least cost as produced at the mine, but the least cost through the entire series of steps from production to delivery.

Blend Search

The proposed inventive method seeks blends of coals that can comprise useful options for analysis for Figure S-1, whereas Vandivier seeks the best recipe for meeting a specification that has already been determined by the user to be optimal. To execute this important function, the process model must be actively linked to a real-time marketplace, that reflects both recent pricing and transport options.

Neural Network

The use of a neural network to impart empirically derived lessons into the engineering production model is unique to the inventive method, as Vandivier does not contemplate furnace and power plant performance beyond that impacted by basic coal attributes.

In summary, distilling the coal purchase decision – or that of any non-commodity – to an analysis of production cost versus operating risk is a key reason this method differs from Vandivier; the method is particularly beneficial when linked to a marketplace of coals on the internet. Thus it is respectfully submitted that the presently claimed invention would not have been obvious over the combination of Vandivier and Katz.

For at least the above reasons, reconsideration and withdrawal of the rejection of claims 1-9 and 13-20 under 35 U.S.C. 103(a) are respectfully requested.

Conclusion

Applicant respectfully submits that this application is in condition for allowance. Should the Examiner disagree and believe that any outstanding issues remain, the Examiner is requested to contact Applicant's undersigned representative to schedule a personal interview to discuss the outstanding issues.

In the event this paper is not considered to be timely filed, Applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to counsel's Deposit Account No. 01-2300, **referencing attorney docket number 023407-00000.**

Respectfully submitted,

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